TAB A: BULK STORAGE CONTAINER GUIDANCE

Preface.

This guidance was derived from 40 CFR 112 of 17 July 2002, and tailored to assist Navy and Marine Corps installations in the interpretation and implementation of SPCC requirements, and in the preparation of installation SPCC Plans. Reference citations from the regulation are included where appropriate, and can be easily distinguished from guidance text by *italic* font located between brackets (e.g., [*§ 112.7(b)*]).

The following section includes guidance on implementation of SPCC Plan requirements pertaining specifically to bulk storage containers. For the purpose of Part 112, any container 55 gal or greater used to store oil constitutes a bulk storage container. This includes ASTs, mobile or portable storage containers, and drums of oil, but excludes oil-filled electrical, operating, or manufacturing equipment (e.g., transformers, switchboxes, etc.) [*§ 112.2*].

An SPCC Plan must be certified by a PE, whose endorsement indicates the Plan not only meets regulatory requirements, but is also adequate for the facility and has been prepared in accordance with applicable industry standards. Therefore, when following the recommendations contained in this document, it should be understood that that the minimum requirements described herein may not be adequate for each facility. Rather, good engineering judgment must be exercised by the certifying PE.

Refer to Section 2 of this document for the sequential section-by-section discussion of the regulation in the order of Part 112.

Bulk Storage Container Guidance for SPCC Requirements.

A.1 Applicability.

Navy and Marine Corps installations that meet either of the following criteria are subject to 40 CFR 112 (providing the installation stores, transfers, distributes, or consumes oil and oil products that could reasonably be expected to reach navigable waters if spilled or released) and must prepare an SPCC Plan [*§ 112.1*]:

- The installation's underground oil storage capacity exceeds 42,000 gal (excluding completely buried storage tanks subject to all of the technical requirements of 40 CFR 280).
- The installation's aggregate aboveground oil storage capacity (including all tanks, containers, and operating equipment 55 gal or greater in capacity) exceeds 1,320 gal.

At an installation where either of the above scenarios apply, bulk storage containers used to store oil must be included in an installation SPCC Plan if they are 55 gal or greater. Oil is defined not only as petroleum products, such as gasoline, diesel, JP-5, and engine oil, but also as animal fats and vegetable oils [*§ 112.2*]. A bulk storage container used to store oil that is 55 gal or greater <u>may</u> not require inclusion in the installation SPCC Plan only under the following circumstances:

- The container is part of a separate facility that must prepare its own separate SPCC Plan.
- The container is part of a separate facility that does not have to prepare an SPCC Plan (i.e., a facility that does not meet the criteria listed above).

In determining whether your installation is subject to Part 112, the total storage capacity must be tabulated, not the amount of oil actually stored. Note that an installation may be subject to Part 112 even if the oil storage capacity is comprised only of 55 gal containers or operating equipment (e.g., transformers) in excess of 55 gal, providing the 1,320 gal aggregate aboveground oil storage capacity threshold is exceeded. Note also that permanently closed tanks (as defined in § 112.2) are not included in the calculation of total storage capacity.

In determining whether a spill or release at your installation could reasonably be expected to reach navigable waters, consideration must solely be based upon the geographical and location aspects of the facility (such as proximity to navigable waters or adjoining shorelines, land contour, drainage, etc.) and must exclude consideration of manmade features such as dikes, equipment, or other structures that might restrain, contain, or otherwise prevent a discharge from occurring.

A.2 Facility Diagram and Site-Specific Drawings.

The location and type of oil (and name, if appropriate) of each container must be depicted on a facility diagram or set of diagrams, along with all associated transfer stations and piping [*§ 112.7(a)(3)*]. In addition, areas where mobile or portable (i.e., not "fixed") containers are stored need to be included on the facility diagram or set of diagrams.

Additional required information specific to each container that must be included in the SPCC Plan, but need not be placed directly on the facility diagram includes:

- The storage capacity [*§ 112.7(a)(3)(i)*].
- Discharge prevention measures for routine handling of products [*§ 112.7(a)(3)(ii)*].
- Discharge drainage control (i.e., secondary containment) around the AST [*§ 112.7(a)(3)(iii)*].

Site-specific drawings are not explicitly required in Part 112; in fact, for many small owner/operators, a facility diagram may be just as detailed as any site-specific drawing, and therefore be completely adequate. However, most Navy and Marine Corps installations are quite sizeable, thus the scale of a facility diagram (or even a set of facility diagrams) may preclude the possibility of depicting the required or useful details of individual oil storage locations throughout the installation. Consequently, it may be desirable to include site-specific drawings in subsequent sections of the SPCC Plan (i.e., in addenda, attachments, appendices, 'write-ups', etc.) to better illustrate these details. A sample site-specific drawing has been included as Figure A-1.

Site or individual container photographs are not required by Part 112. However, most Navy and Marine Corps SPCC Plans do include photographs taken during site surveys (typically with digital cameras). Users of SPCC Plans containing photographs invariably find inclusion of these images in the Plan beneficial, especially when reviewing the large number of sites and bulk storage containers that installations often have. Photographs assist the reader in rapid recognition of the site or container in question, and can illustrate a visual history of numerous aspects of the physical condition of the site or container. Photographs can also assist the PE or other surveyor of the facility by providing additional or overlooked information after the survey has been concluded, when the actual site or container is no longer conveniently accessible.

The addition of site-specific drawings and/or photographs add to the complexity of an SPCC Plan or plan update, and could therefore potentially increase the cost of the project.

A.3 Fault Analysis.

The direction, rate of flow, and total quantity of oil that could be discharged from the facility as a result of each type of major equipment failure must be predicted where experience indicates a reasonable potential for equipment failure. Major equipment failure may include loading/unloading equipment, or tank overflow, rupture, or leakage [*§ 112.7(b)*].

If site-specific drawings are included in the SPCC Plan, illustrate the predicted discharge directions in the drawings (see Figure A-1 on the following page). It will still be necessary to discuss the rate of flow and total quantity of oil that could be discharge as a result of the different types of equipment failure. If site-specific sections are not included in the SPCC Plan, discuss the discharge direction, rate of flow, and total quantity predictions throughout the installation (e.g., include tables or matrices listing these attributes of each site or bulk storage container).

A.4 Secondary Containment.

Bulk storage containers that are 55 gal or greater and have a reasonable potential to discharge oil to navigable waters must have some form of containment and/or diversionary structures that would prevent a discharge from reaching the navigable waters. At minimum, one of the following discharge prevention systems must be used [*§ 112.7(c)*]:

- Dikes, berms, or retaining walls sufficiently impervious to contain oil.
- Curbing.
- Culverting, gutters, or other drainage systems.
- Weirs, booms, or other barriers.
- Spill diversion ponds.
- Retention ponds.
- Sorbent materials.

In practice, the certifying PE must be comfortable with the adequacy of the discharge prevention system (or system the PE recommends in the SPCC Plan). For instance, staging sorbent materials beside a 5,000 gal AST in close proximity to the waterfront and providing no other means of discharge prevention would clearly be unacceptable.

Although not specifically identified as secondary containment systems in § 112.7(c), buildings may themselves be adequate diversionary structures, exhibiting the containment characteristics of dikes, retaining walls, or other barriers. However, the floors and walls of the structure would have to be sufficiently impervious to contain oil (e.g., free of floor drains, cracks, and porous joints or gaps).

Bulk storage container installations must provide secondary containment for the largest single container plus sufficient freeboard to contain precipitation. Diked areas must also be sufficiently impervious to contain a discharge [*§ 112.8(c)(2)*].

In designing a dike to provide secondary containment, it is often adequate to design the dike to contain 110% of the contents of the largest single container. However, this may be insufficient if the dike area has a large footprint, or if the installation is located in a region subject to heavy or frequent rains. To ensure precipitation will be adequately accounted for, the height of the dike should be designed to accommodate not only the volume of oil storage, but also the depth of rainfall associated with the 24-hour, 25-year storm event for the area (refer to the guidance section following § 112.8(c)(2) on Section 2 Page 34 for further discussion).

Diked areas must prevent discharges and precipitation from leaking out into the surrounding area or infiltrating into the soil beneath the containment area. Cracks or holes that develop must be properly repaired and sealed. Discharges that occur at remote or infrequently accessed bulk storage containers, or discharges occurring on weekends, holidays, or during the night must be fully retained by the secondary containment until it can be properly removed. A 72-hour impervious standard for the secondary containment was proposed by the EPA, but later dropped. [This 72-hour standard has been included here only to provide a frame of reference; there is no actual time interval defined or implied in § 112.8(c)(2).]

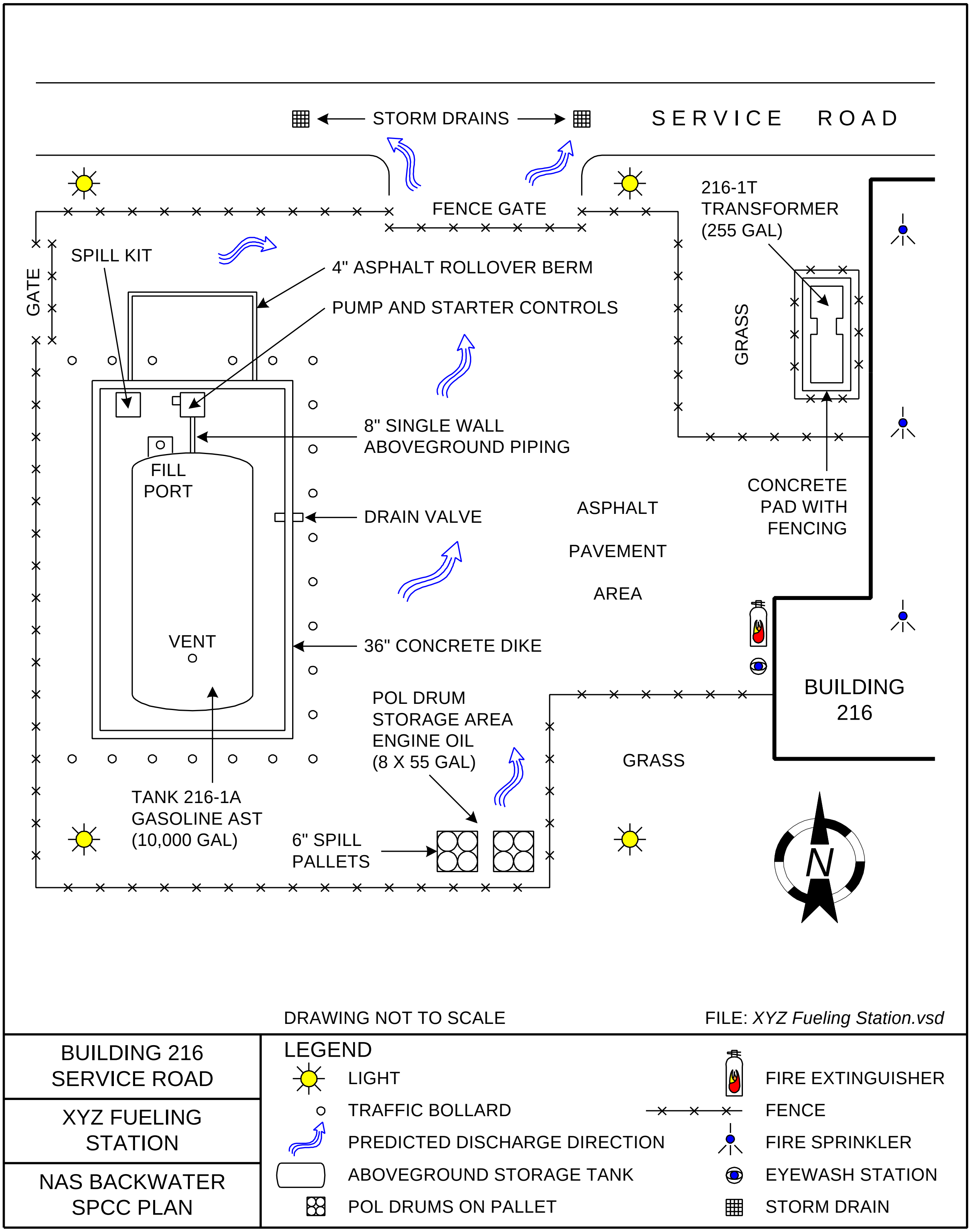

Figure A-1 Sample Site Drawing. Example of a site drawing to be included in a site-specific section.

In rare cases, installation of secondary containment structures or pieces of equipment may be determined to be not practicable. In such instances, a clear explanation of why such measures are not practicable must be provided in the SPCC Plan. The reason for nonconformance must be justified, and alternate methods of 'equivalent environmental protection' must be provided [*§ 112.7(d)*]. Note that costs or economic impacts are excluded justifications as to why an installation cannot satisfy the secondary containment requirement. Justifiable reasons why secondary containment may be considered not practicable include:

- Space or other geographic limitations of the facility.
- Local zoning ordinances, fire prevention standards, or safety considerations.
- Installation would defeat the overall goal of 40 CFR 112 to prevent discharges.

If site-specific sections are included in the SPCC Plan, secondary containment and/or diversionary structures could be depicted in those drawings (see Figure A-1) and/or illustrated in photographs. However, this approach is not mandatory; the requirement is only for secondary containment to be adequately described in the Plan (whether in text, diagrams, photographs, or a combination of these). If site-specific sections are not included in the SPCC Plan, discuss how secondary containment is provided throughout the installation (e.g., include a table or matrix listing the secondary containment attributes for each bulk storage container).

Refer to the following industry standards for further guidance on secondary containment: Section 7 of API Standard 2610, "Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities" and Chapter 2 of NFPA 30, "Flammable and Combustible Liquids Code".

<u>Cost Information</u>
There are numerous approaches to bring a bulk storage container into compliance with regard to secondary containment. In identification and selection of various options, the costs of implementation are paramount. The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to construction or equipment purchase.

Information on numerous approaches to secondary containment and related items is included in Section 4 Appendix A. Approaches and items discussed include:

- Portable containment berms: $200 - $1,400 for smaller berms, $3,000 - $7,000 for larger berms (per vendors).
- Drum containment pallets and pallet inserts: $150 - $600 for pallets accommodating 2 - 4 drums, $450 - $600 for pallet inserts containing 55 - 80 gal (per vendors).
- Spill kits: $100 - $1,000 per spill kit (per vendors).
- Drain covers: $100 - $500 per cover (per vendors).
- Concrete berm design: $3,130 - $10,239 for tank capacities of 500 - 5,000 gal (per PWD).
- Masonry berm design: $1,547 - $2,686 for tank capacities of 250 - 1,000 gal (per PWD).
- Rollover (drivable) berm design for loading/unloading areas: $3,775 - $11,713 for tank capacities of 1,000 - 5,000 gal (per PWD).
- Earth berm design: $857 - $1,322 for tank capacities of 250 - 1,000 gal (per PWD).
- Repair or sealing of cracks and fissures: $30 - $35 per linear foot (per PWD).
- Doorway spill barriers: $2,985 - $10,909 for manual or automatic barriers from 3' - 10' wide (per vendors).
- Oil-swellable absorbent polymer storm drain inserts: $800 - $10,000 for drain protection shut-off systems or $81 - $227 for Imbiber Bead packets, pillows, blankets, boom, etc. (per vendors).

A.5 Deviation from Secondary Containment Requirement (Contingency Planning).

Where it is not feasible to install secondary containment, bulk storage containers must undergo periodic integrity testing, and any associated valves and piping must undergo periodic integrity and leak testing.

An explanation of why secondary containment is not practicable must be provided, and unless the installation maintains a Facility Response Plan (FRP), a contingency plan and a written commitment of manpower, equipment, and materials dedicated to oil spill response must also be provided [*§ 112.7(d)*].

Refer to Section A.9 for further guidance on integrity testing requirements for ASTs.

A.6 Security.

Security at bulk storage containers can be achieved through fencing, locking, lighting, monitoring, etc. [*§ 112.7(g)*]. Refer to Section 4 Tab E, Security Guidance, for further discussion.

A.7 Brittle Fracture Evaluation.

Field-constructed ASTs that may be subject to brittle fracture failure must be evaluated for risk of discharge or catastrophic failure, in order to help prevent future failure [*§ 112.7(i)*].

Brittle fracture is a type of fracture that occurs where cracks rapidly propagate through a stressed material (i.e., there is very little plastic or ductile deformation before failure occurs). The cracks run perpendicular to the applied stress, leaving a relatively flat surface after the after the fracture. In many cases, brittle facture is the worst type of fracture, because visible damage in a part or structure cannot be repaired before it breaks. This type of fracture occurs under specific conditions without warning and can cause major damage.

Experience has shown that once a field-constructed AST has demonstrated the ability to withstand the combined efforts of maximum liquid level (i.e., highest stress) and lowest operating temperature without failing, the risk of failure due to brittle fracture with continued service is minimal. However, any change in service must be evaluated to determine if it increases the risk of failure due to brittle fracture. In the event of a change to a more severe service (e.g., operating at a lower temperature or handling product at a higher specific gravity), it is necessary to consider the need for a hydrostatic test to demonstrate fitness for a new more severe service.

Tanks are to be evaluated whenever repair, alteration, reconstruction, or change in service has occurred. Clarifications of these terms are provided below:

- *Repair:* any work necessary to maintain or restore a container to a condition for safe operation, such as removal and replacement of material (e.g., roof, shell, or bottom material) to maintain container integrity; re-leveling or jacking of the container, shell, or bottom; addition of reinforcing plates to existing shell penetrations; or repair of flaws by grinding or gouging followed by welding.
- *Alteration:* any work on a container involving cutting, burning, welding, or heating operations that change the physical dimensions or configurations of the container.
- *Reconstruction:* any work necessary to reassemble a tank that has been dismantled and relocated to a new site.
- *Change in Service:* any change from previous operating conditions involving different properties of the stored product (e.g., specific gravity, corrosivity) or service conditions (e.g., temperature, pressure).

Section 5 of API Standard 653, “Tank Inspection, Repair, Alteration, and Reconstruction” and API Recommended Practice 920 “Prevention of Brittle Fracture of Pressure Vessels” can be used to assist with brittle fracture evaluation. Brittle fracture evaluations of ASTs may be performed by Facilities or Public Works, Engineering Field Divisions (EFD) or Naval Facilities Engineering Service Center (NFESC), or knowledgeable contractors or private engineering firms

The SPCC Plan should include a discussion of which, if any, tanks at the installation may be susceptible to brittle fracture. Describe what measures are in place to address any warning signs of brittle fracture in facility ASTs.

Cost Information
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to testing on a case-by-case basis.

Information on brittle fracture evaluation is included in Section 4 Appendix A:

- Brittle fracture evaluation: $3,500 - $6,000 plus travel expenses for a 20,000 gal tank (per NFESC).

A.8 Corrosion Protection.

Completely buried USTs must be protected from corrosion by coatings or cathodic protection [*§ 112.8(c)(4)*], as must partially buried or bunkered tanks [*§ 112.8(c)(5)*]. Completely buried USTs must also be regularly leak tested.

In many instances, USTs are subject to 40 CFR 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks. USTs at these installations must follow the corrosion protection provisions of Part 280, which provides comparable environmental protection to Part 112. USTs at Installations not subject to Part 280 must follow the corrosion protection provisions of section § 112.8(c)(4) and applicable industry standards.

Partially buried or bunkered tanks are considered ASTs for Part 112, not USTs, and must therefore follow the corrosion protection provisions of section § 112.8(c)(5) and applicable industry standards (i.e., they are not regulated by Part 280).

Partially buried or bunkered tanks are considered ASTs for Part 112, not USTs, and must therefore follow the corrosion protection provisions of section § 112.8(c)(5). In terms of susceptibility to corrosion, however, they are essentially similar to USTs. Note that unlike ‘completely buried tanks’, described in § 112.8(c)(4), partially buried or bunkered tanks are not required to be regularly leak tested [by § 112.8(c)(5)], although they are subject to the integrity testing requirements of § 112.8(c)(6)).

Although partially buried or bunkered tanks are considered ASTs for the purposes of Part 112, they may also be considered USTs for the purposes of Part 280 (and thereby subject to its provisions), if at least 10% of the tank (including piping) is underground. However, if the tank is less than 110 gal, or if it is a vaulted tank, it would not be covered under Part 280. Also, field constructed tanks (whether completely or partially buried or bunkered) are excluded from Part 280, and are therefore, by default, covered under Part 112.

Refer to the following industry standards for further guidance on corrosion protection: API Recommended Practice 651, “Cathodic Protection of Aboveground Storage Tanks” and API Recommended Practice 652, “Lining of Aboveground Petroleum Storage Tank Bottoms”, and Section 10 of API Standard 2610, “Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities”.

Cost Information
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to testing on a case-by-case basis.

Information on cathodic protection retrofitting, monitoring and testing, and related measures is included in Section 4 Appendix A. Section 4 Appendix C provides more detailed estimates on cathodic protection system surveys. Measures and approaches discussed include:

- Cathodic protection retrofitting: 5% - 20% of the cost of a similar new installation, when retrofitting existing buried tanks and pipelines (per NFESC).
- Cathodic protection monitoring and testing: up to $8,000 for first time or full (annual) cathodic protection surveys for large tank farms, or up to $7,000 for extensive piping systems, not including travel or report expenses (per NFESC); $1,800 per year per tank for UST corrosion protection testing for impressed current systems, or $600 per year per tank for magnesium anode systems (per Navy Environmental Requirements Guidebook).
- Leak testing USTs and bunkered ASTs: $1,500 per year per tank for UST tightness testing and $750 per year per pipe run, $5,000 - $50,000 for periodic leak detection on large field-constructed USTs (per Navy Environmental Requirements Guidebook); $15,000 per 567,000 gal UST for tracer testing, or $3.76 per linear foot for pipeline tracer testing (per NAS North Island).

A.9 Integrity Testing

Aboveground containers must be tested for integrity on a regular schedule and whenever repairs are made [*§ 112.8(c)(6)*].

Not to be confused with routine visual inspections, integrity testing consists of any means to measure the strength (i.e., structural soundness) of the container shell, bottom, or floor to contain oil, and may include leak testing to determine whether the container will discharge oil. Integrity testing includes both the inside and outside of the container, as well as the foundations and supports. Leak testing is performed to determine the liquid tightness of tanks, valves, and piping, and to determine whether they have potential to release or are at risk of releasing oil.

The following types of testing can be employed to determine the integrity of a container and the integrity and liquid tightness of associated valves and piping [*§ 112.8(c)(6)*]:

- Hydrostatic Tests.
- Radiographic Tests.
- Ultrasonic Tests.
- Acoustic Emissions Tests.
- Other Non-Destructive Tests.

Drums and other non-AST bulk storage containers are not exempt from this periodic integrity testing requirement. Per EPA policy, however, 55 gal drums with secondary containment (e.g., placed on spill containment pallets) that are visible from all sides to allow periodic inspections do not require integrity testing (see Section 4 Appendix F). A clear explanation of why integrity testing of drums is not practical, and how ‘equivalent environmental protection’ is provided (e.g., monthly inspections, storage on containment pallets, use of DOT-certified drums, strong contingency plan, etc.) must still be included in the SPCC Plan [*§ 112.7(a)(2)*].

The EPA chose not to define a required frequency for integrity and leak testing, instead opting to require ‘periodic’ testing be performed in accordance with industry standards. Earlier, the EPA had proposed the following frequencies be followed:

- Integrity test tanks without secondary containment every 5 years.
- Integrity test tanks with secondary containment every 10 years.

[These testing intervals have been included here only to provide a frame of reference; no intervals are defined or implied in § 112.8(c)(6).] The schedule the PE selects should be based on industry standards, and must be clearly documented in the Plan.

Refer to the following industry standards for further guidance on AST testing methods and appropriate frequencies: Section 12 of API Standard 653, “Tank Inspection, Repair, Alteration, and Reconstruction”, and Section 5.0 of STI SP001-00, "Standard for Inspection of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids".

<u>Cost Information</u>
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy or scale, location, mobilization, region, etc. Actual costs should be verified prior to testing on a case-by-case basis.

Information on integrity testing and related measures is included in Section 4 Appendix A. Relevant items discussed include:

- Non-destructive shell testing: $10,000 - $30,000 per tank for API 653 inspections of large tanks, plus $5,000 - $20,000 for tank cleaning (per NFESC); $500 - $2,500 per tank (per Navy Environmental Requirements Guidebook).

A.10 Alarm Systems

Each container installation must be engineered or updated with one of the following liquid level sensing devices [*§ 112.8(c)(8)*]:

- High liquid level alarms with an audible or visual signal.
- High liquid level pump cutoff devices to stop flow at a predetermined level.
- Direct audible or code signal communication between the container gauger and the pumping station.
- A fast response system for determining liquid level, such as digital computers, telepulse, or direct vision gauges.

Good engineering judgment should be used when selecting overfill protection devices. For instance, a 20,000 gal tank at a fuel farm or airfield should employ some type of a visual or audible high liquid level alarm and/or cutoff device, whereas a sight glass on a 100 gal arresting gear tank may be sufficient. Liquid level sensing devices must be regularly tested to ensure proper operation

If site-specific sections are included in the SPCC Plan, describe the liquid level sensing devices and systems in these sections, as well as the frequencies and methods of testing the devices to ensure proper operation. If site-specific sections are not included in the SPCC Plan, discuss the alarms in use throughout the installation and how their proper operation is ensured (e.g., include a table or matrix listing the devices and systems for each bulk storage container).

Note that there may be defensible reasons (e.g., spatial limitations, safety concerns, costs or economic impacts) why a facility may deviate from the overfill protection system requirement. In such instances, a clear explanation of why such a device is not practicable must be provided in the Plan. The reason for nonconformance must be justified, and alternate methods of 'equivalent environmental protection' must be provided (refer to § 112.7(a)(2)).

Refer to the following industry standards for further guidance on alarm systems, discharge prevention systems, and inventory control: Chapters 2 and 5 of NFPA 30, "Flammable and Combustible Liquids Code" and API Recommended Practice 2350, "Overfill Protection for Storage Tanks in Petroleum Facilities".

<u>Cost Information</u>
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to equipment purchase on a case-by-case basis.

Information on alarm systems and liquid level sensing devices is included in Section 4 Appendix A. Items discussed include:

- Automatic tank gauging systems: centrally funded by DESC for facilities storing DESC product (per Naval Petroleum Office).
- Liquid level sensing device testing and maintenance: $200 - $1,000 per device (per Navy Environmental Requirements Guidebook).
- Level sensors with audible and/or visual overfill alarms: $7,500 - $10,000 plus $5,000 for installation for a typical complete fuel monitoring system utilizing magnetorestrictive technology for two tanks, or as low as $2,000 - $3,000 plus installation for basic, less automated magnetorestrictive systems (per vendor).